I. C. 7507

JUN 22 1949
O. S. U. LIBRARY

JUNE 1949

UNITED STATES
DEPARTMENT OF THE INTERIOR
J. A. KRUG, SECRETARY

BUREAU OF MINES
JAMES BOYD, DIRECTOR

INFORMATION CIRCULAR

MINING METHODS AND COSTS AT THE KEARNEY ZINC-LEAD MINE, CENTRAL MINING DISTRICT GRANT COUNTY, N. MEX.

BY

WALTER R. STORMS AND JERRY W. FAUST

Generated on 2024-09-19 20:59 GMT / https://hdl.handle.net/2027/osu.32435030643779
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from THE OHIO STATE UNIVERSITY

1849 1949

A Century of Conservation

Generated on 2024-09-19 20:55 GMT / https://hdl.handle.net/2027/osu.32435030643779
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Digitized by Google

Original from
THE OHIO STATE UNIVERSITY

I.C. 7507,
June 1949.

INFORMATION CIRCULAR

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

MINING METHODS AND COSTS AT THE KEARNEY ZINC-LEAD MINE, CENTRAL MINING DISTRICT, GRANT COUNTY, N. MEX.[1]

By Walter R. Storms[2] and Jerry W. Faust[3]

CONTENTS

	Page
Introduction and summary	2
Acknowledgments	2
History	2
Geology	3
Methods of prospecting and exploration	4
Methods of sampling and estimation of tonnages and values	4
Development methods:	
Shafts	4
Drifts and crosscuts	5
Raises	5
Mining (stoping) methods	6
Transportation	7
Ventilation	7
Drainage	7
Safety measures	8
Surface plant	8
Organization	9
Wage scale	9
Costs	10

ILLUSTRATIONS

Fig.		Following page
1.	Location map	2
2.	General surface map	2
3.	Kearney mine surface	2
4.	Composite Kearney mine map	2

1/ Manuscript completed in September 1948. The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is made: "Reprinted from Bureau of Mines Information Circular 7507."

2/ Senior mining engineer, Tucson Branch, Mining Division, Bureau of Mines.
3/ General mine superintendent, New Mexico Consolidated Mining Co. (Peru Mining Co. of Illinois Zinc).

Generated on 2024-09-19 20:54 GMT / https://hdl.handle.net/2027/osu.32435030643779
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from THE OHIO STATE UNIVERSITY

ILLUSTRATIONS (Cont'd)

Fig.		Following page
5.	Section through mine	2
6.	Section through mine	2
7.	Section through mine	2
8.	Section through mine	2
9.	Starting a stope	6

INTRODUCTION AND SUMMARY

This paper, which describes mining methods and costs at the Kearney zinc-lead mine, is one of a series being prepared by the Mining Division of the Bureau of Mines on mining practices, methods, and costs in various mining districts of the United States.

The Kearney mine, which is owned by the New Mexico Consolidated Mining Co., a subsidiary of the Peru Mining Co. (Illinois Zinc), is situated a few miles southeast of the town of Hanover, in the northwest corner of sec. 27, T. 17 S., R. 12 W., in the Central Mining District, Grant County, N. Mex. (Figs. 1 and 2.)

This report presents a brief history of the district, describes the geology, and outlines methods of prospecting and exploration, including sampling and estimation of tonnages and values. Development and mining methods are explained, and transportation, ventilation, drainage, safety measures, and organization are described. The wage scale and mining costs comprise the concluding sections of the report.

ACKNOWLEDGMENTS

Acknowledgment is made to the officials of the New Mexico Consolidated Mining Co. for permission to publish this report, and especially to James A. Hill, president, Joseph H. Taylor, vice-president and general manager, and George Williams, mining engineer. Special acknowledgment also is due J. H. Hodges, chief of the Tucson Branch of the Mining Division, Bureau of Mines, for his suggestions and help in preparing this paper.

HISTORY

Mining began in the Central district about 1804, when copper was produced at Santa Rita. About 1858, the old Hanover mine northwest of the town of Fierro was producing copper. In 1891, iron ore from near Fierro was shipped to Pueblo, Colo., over the newly built branch of the Silver City & Northern Railroad (now a branch of the Atchison, Topeka & Santa Fe). Several copper properties in the Hanover area started exploratory work about that time, and the mining of oxidized zinc ores began.

Mining has gradually increased in the district during the present century, until current copper and zinc production is the largest on record.

Generated on 2024-09-19 20:58 GMT / https://hdl.handle.net/2027/osu.32435030643779
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from THE OHIO STATE UNIVERSITY

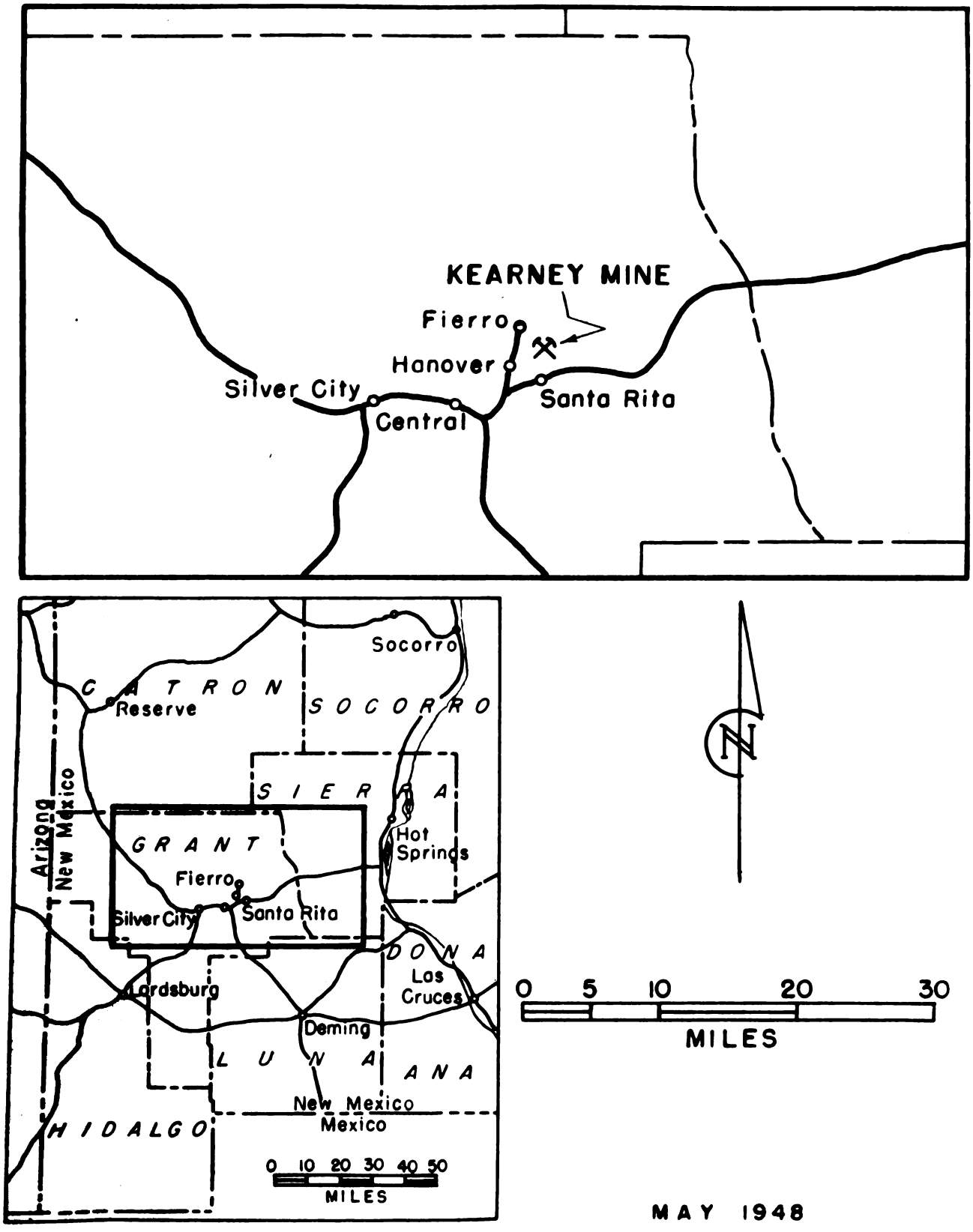

Figure 1. - Location map.

Generated on 2024-09-19 20:56 GMT / https://hdl.handle.net/2027/osu.32435030643779
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from THE OHIO STATE UNIVERSITY

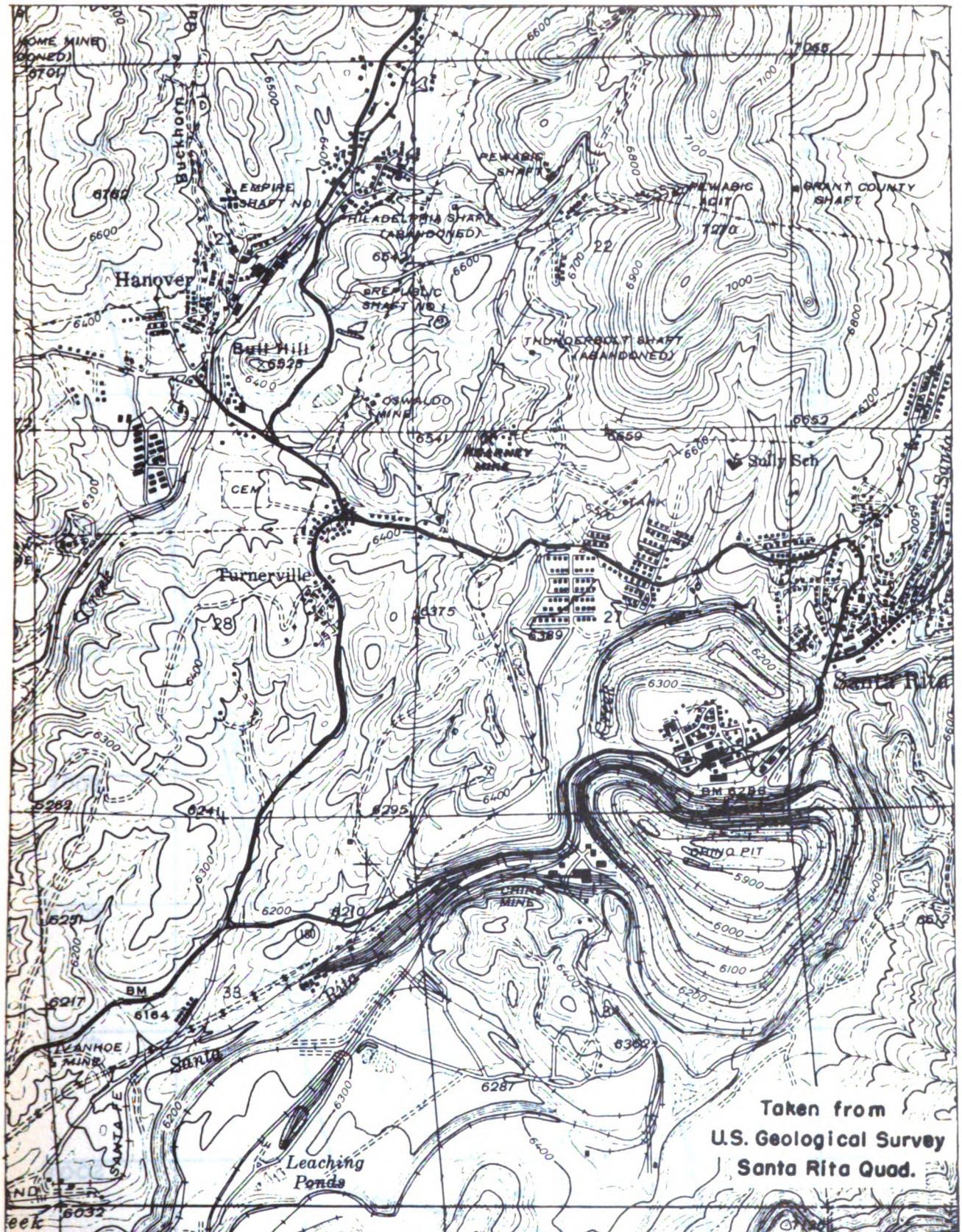

Figure 2. - Surface map.

Generated on 2024-09-19 20:55 GMT / https://hdl.handle.net/2027/osu.32435030643779
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from
THE OHIO STATE UNIVERSITY

Generated on 2024-09-19 20:57 GMT / https://hdl.handle.net/2027/osu.32435030643779
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

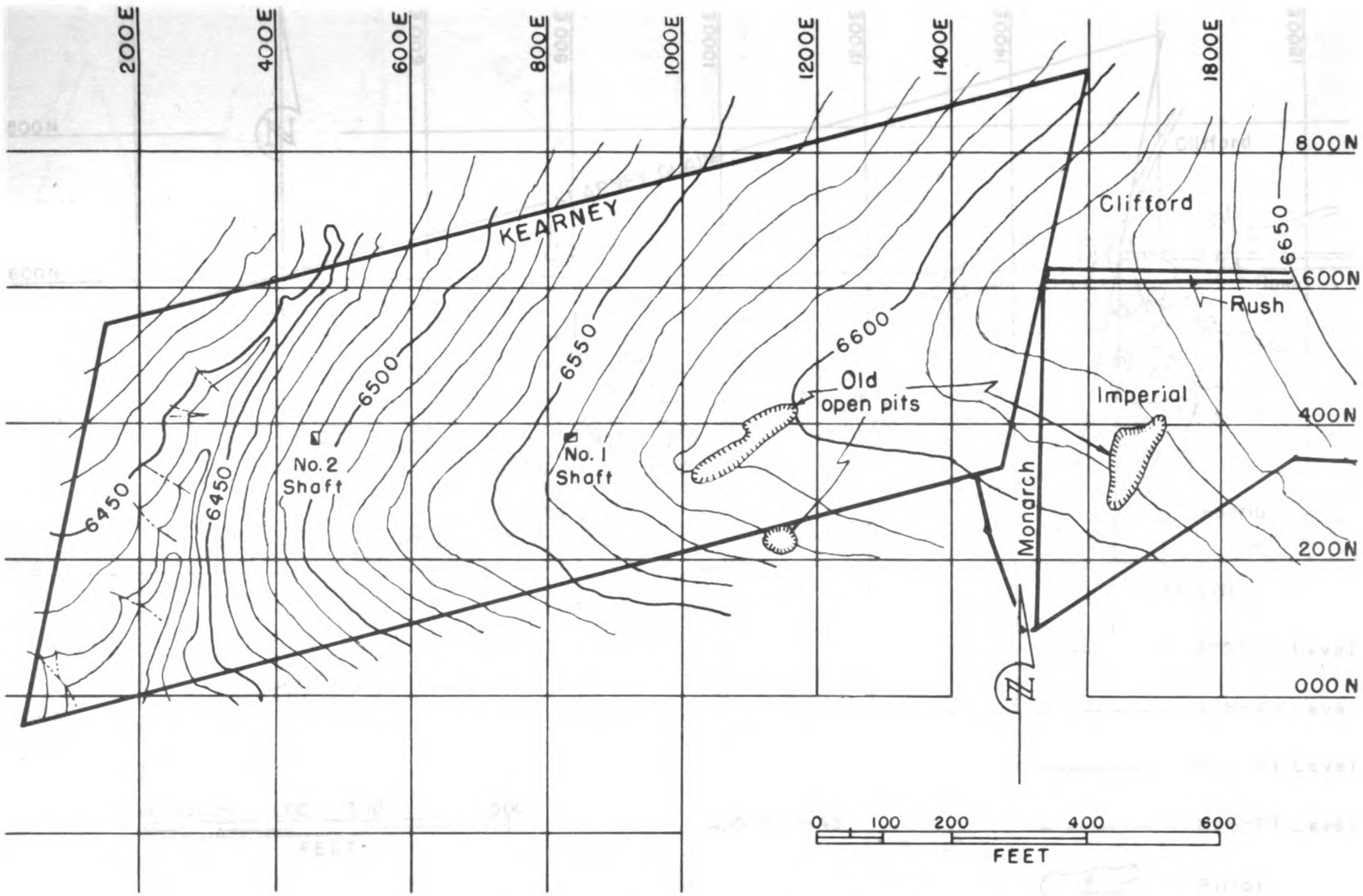

Figure 3. - Surface map at Kearney mine.

Digitized by Google
Original from THE OHIO STATE UNIVERSITY

Generated on 2024-09-19 20:58 GMT / https://hdl.handle.net/2027/osu.32435030643779
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

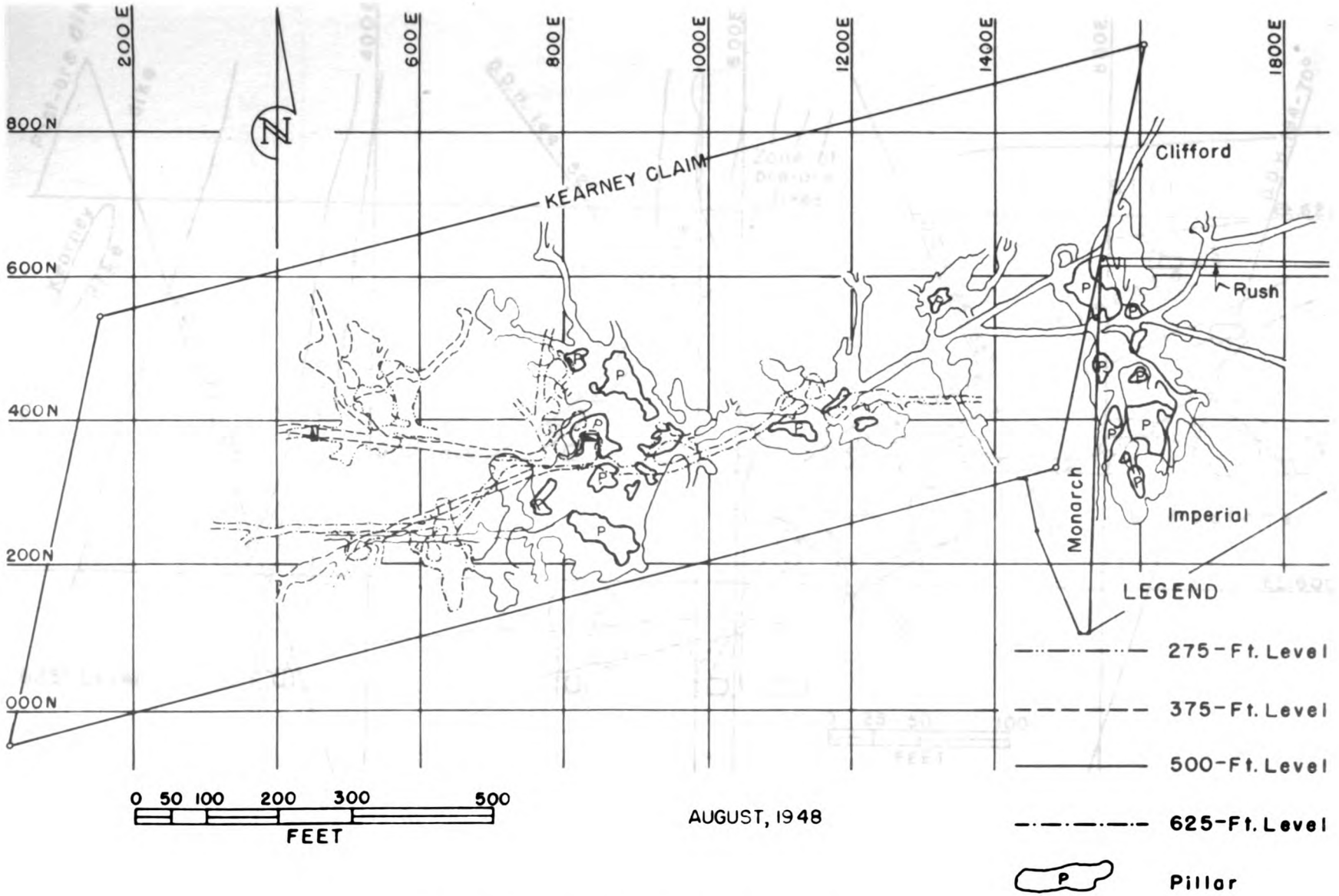

Figure 4. - Composite Kearney mine map.

Digitized by Google
Original from THE OHIO STATE UNIVERSITY

Generated on 2024-09-19 20:56 GMT / https://hdl.handle.net/2027/osu.32435030643779
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

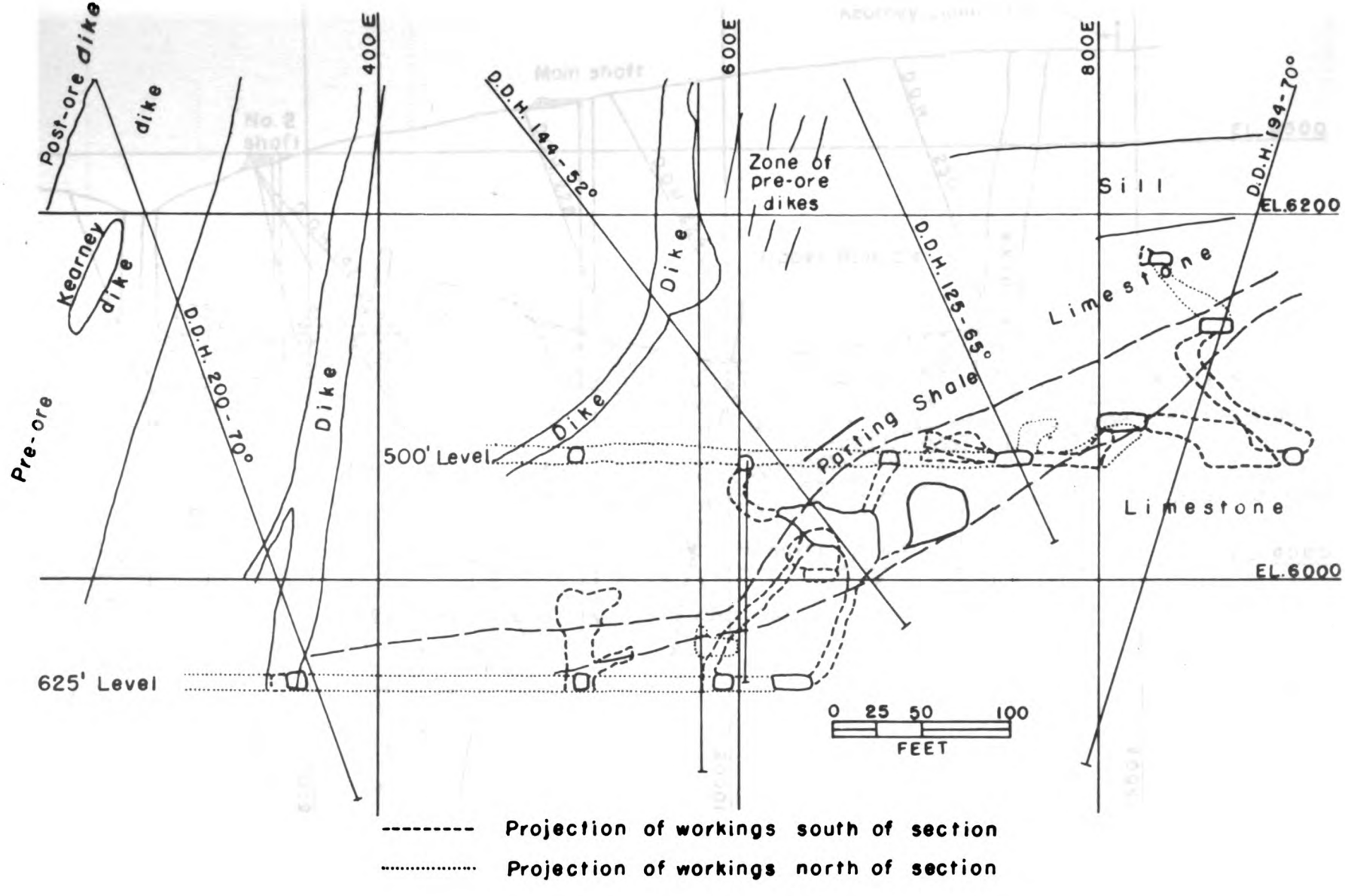

Figure 5. - Vertical section through Kearney mine along coordinate N. 230.

Digitized by Google
Original from THE OHIO STATE UNIVERSITY

Generated on 2024-09-19 21:00 GMT / https://hdl.handle.net/2027/osu.32435030643779
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

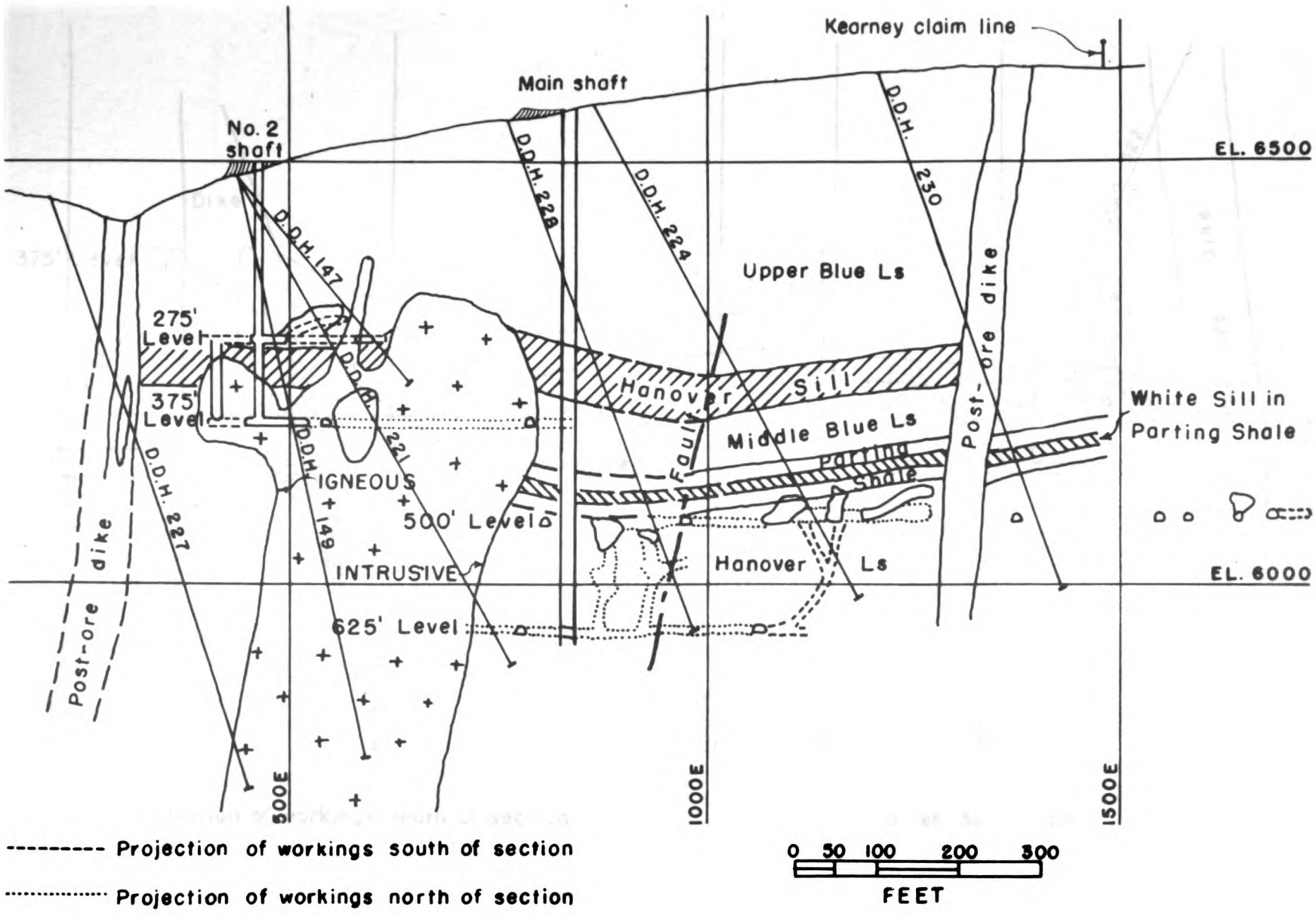

Figure 6. - Vertical section through Kearney mine along coordinate N. 380.

Digitized by Google
Original from THE OHIO STATE UNIVERSITY

Generated on 2024-09-19 20:57 GMT / https://hdl.handle.net/2027/osu.32435030643779
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

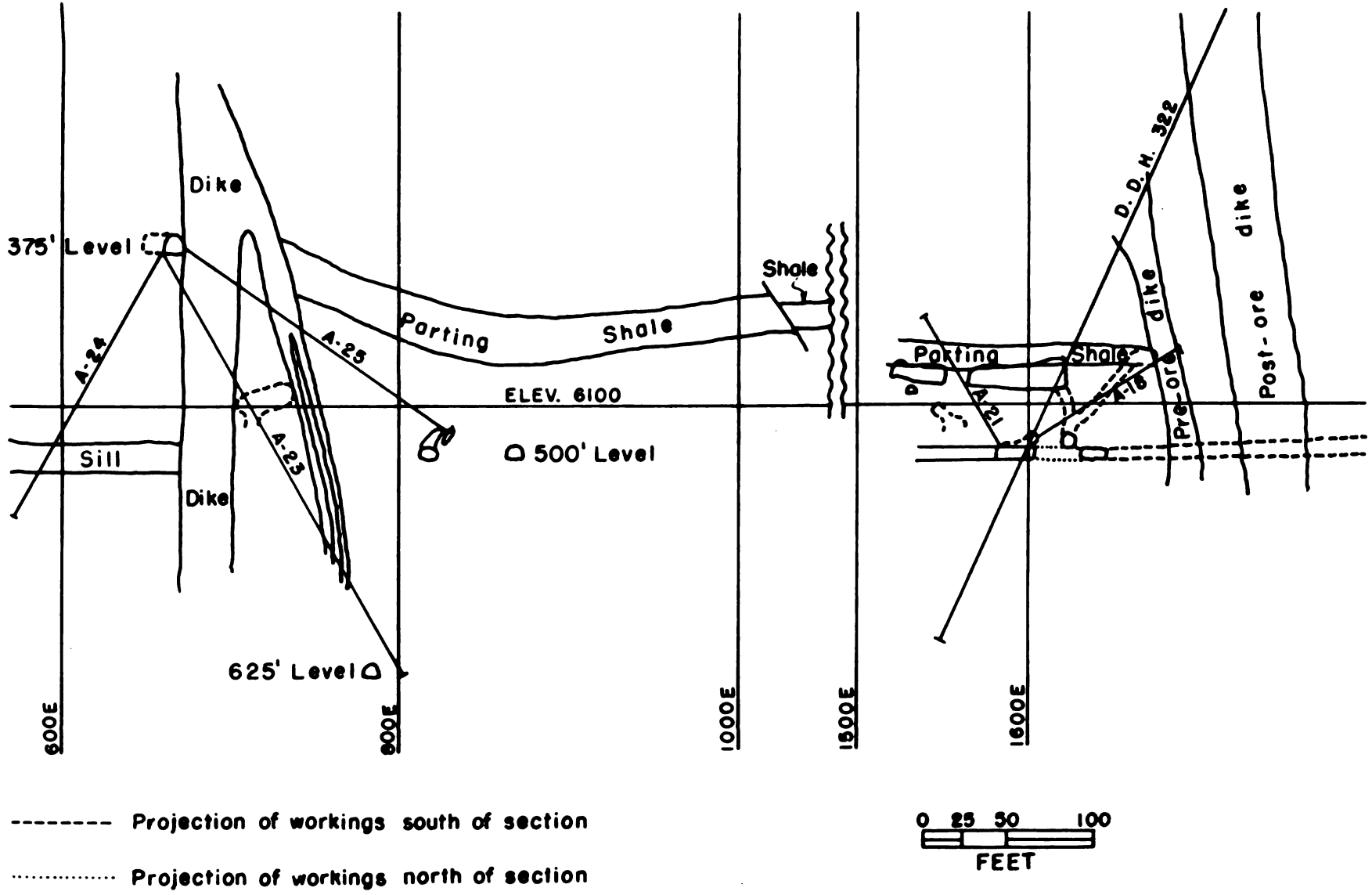

Figure 7. - Vertical section through Kearney mine along coordinate N. 530.

Digitized by Google
Original from THE OHIO STATE UNIVERSITY

Generated on 2024-09-19 21:03 GMT / https://hdl.handle.net/2027/osu.32435030643779
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

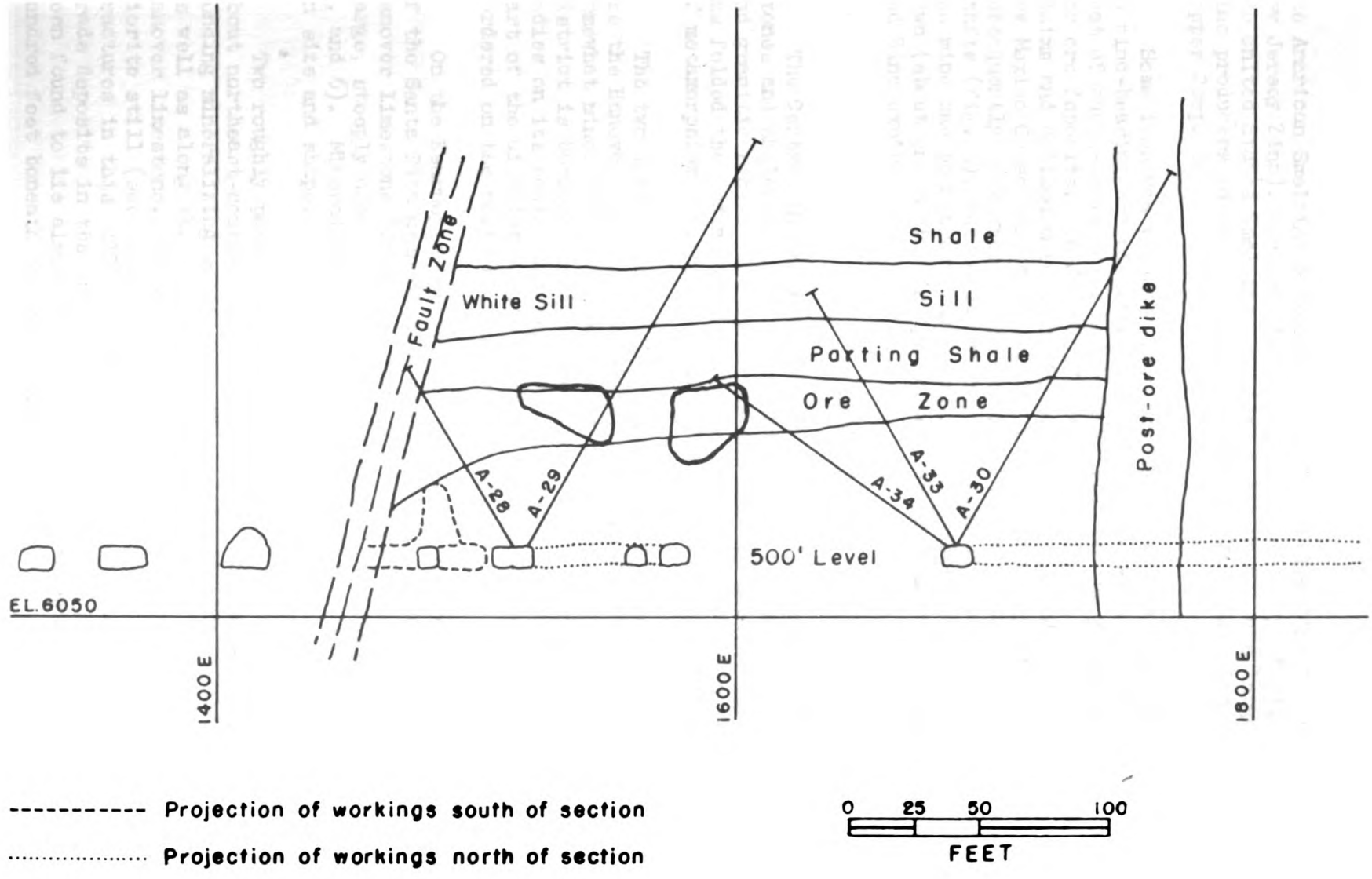

Figure 8. - Vertical section through Kearney mine along coordinate N. 617.

Digitized by Google
Original from THE OHIO STATE UNIVERSITY

The American Smelting & Refining Co., the Empire Zinc Co. (a subsidiary of New Jersey Zinc), the Peru Mining Co. (a subsidiary of Illinois Zinc), and the United States Smelting, Refining & Mining Co. are large present-day zinc producers in the district. The Chino Mines Division of Kennecott Copper Corp. is the only large producer of copper.

Some iron was produced from the Kearney claim several years ago, but no zinc-bearing ore was mined until 1943. Between 1931 and 1934, over 1,000 feet of churn-drill holes had been drilled on the property during prospecting for ore deposits. In July 1937, the Peru Mining Co. took an option on the claims and drilled more than 12,000 feet of diamond-drill holes. Later, the New Mexico Consolidated Mining Co. was organized by the Peru Mining Co. and subsequently took over the property. In March 1942 it began sinking two shafts (fig. 3), but actual zinc production did not begin until March 1943. The mine has been producing steadily since that date except for a short shutdown (about one month) in 1947 after the Premium Price Plan for Copper, Lead, and Zinc expired.

GEOLOGY

The Central Mining District is essentially an area of Paleozoic limestones and shales which has been intruded by Cretaceous monzonitic porphyries and granitic rocks. The larger of the igneous masses, the Hanover intrusive, has folded the sediments. It was an important factor in the localization of metamorphism and the formation of zinc, copper, and iron deposits.

The two most important intrusives from the standpoint of ore formation are the Hanover and the Santa Rita, the Copper Flat intrusive playing a somewhat minor role. The Hanover intrusive in the northern part of the district is bordered by iron-ore bodies on its north contact and zinc ore bodies on its south contact. The Santa Rita intrusive in the southeastern part of the district contains and is bordered by copper ores, and also is bordered on the north by zinc ore deposits.

On the Kearney property, the major zinc ore bodies occur to the north of the Santa Rita granodiorite stock, chiefly as bedded deposits in the Hanover limestone (Crynoidal limestone) of Mississippian age, along two large, steeply dipping faults and beneath a thick diorite still (see figs. 4, 5, and 6). Mineralization is fairly irregular, and ore shoots vary greatly in size and shape.

Two roughly parallel faults, the Kearney and the Magnetite, which strike about northeast-southwest, seem to have been the principal pathways for ascending mineralizing solutions. The solutions came up along these faults as well as along the Clifford fault (see fig. 4), and then replaced the Hanover limestone. The major part of known ore occurs beneath a thick diorite still (see figs. 5 to 8), although enough solution passed through fractures in this sill to form gossanized areas on the surface and some low-grade deposits in the upper limestone. To date, all known ore bodies have been found to lie almost vertically beneath these gossans, although several hundred feet beneath the surface.

Generated on 2024-09-19 20:55 GMT / https://hdl.handle.net/2027/osu.32435030643779
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from THE OHIO STATE UNIVERSITY

The chief mineralized limestone beds, where mined, are up to 110 feet thick. However, stoping height averages only about 25 feet. The beds dip approximately 15 degrees to the south. Tops and bottoms of ore shoots are very irregular, tongues of ore going up into the overlying limestone and down into that beneath the ore body. The lateral extent of the ore shoots also is very irregular, the ore usually grading into low-grade material that can not be mined at present metal prices.

The principal ore-forming mineral at the Kearney is sphalerite, with small amounts of galena and very small quantities of chalcopyrite. Ore mined has ranged from 5.3 to 15.7 percent zinc, with lead running from 0.35 to 1.5 percent. A very small amount of copper and a fraction of an ounce of silver a ton occurs in the ore. In May 1948 the ore averaged 7.5 percent zinc and 0.5 percent lead.

METHODS OF PROSPECTING AND EXPLORATION

As already mentioned, over 1,000 feet of holes were churn-drilled on the property between 1931 and 1934 in search of ore deposits. In July 1937 the Peru Mining Co. took an option on the property and drilled more than 12,000 feet of core holes between that date and 1942. These diamond-drill holes explored regions beneath some of the surface gossan areas and discovered substantial amounts of zinc-lead ore in the Hanover limestone along several large pre-mineral faults.

After the mine had been developed by the New Mexico Consolidated Mining Co., a subsidiary of the Peru Mining Co., underground exploration continued. Two small air-powered diamond drills were purchased, and possible ore-bearing areas were explored by short core holes drilled from underground stations. Several ore bodies were outlined in this manner before they were developed. At the present time both drills are being operated underground by company employees, on two shifts, in prospecting and exploratory work.

METHODS OF SAMPLING AND ESTIMATION OF TONNAGES AND VALUES

Churn-drill holes were sampled from sludge taken at 5-foot intervals. Diamond drill-hole cores were split by hand, half the sample being taken for assay.

To estimate tonnage, a figure of 10 cubic feet a ton of ore is used. Thus, the area, in square feet, between diamond drill holes multiplied by the average footage of ore in the holes and divided by 10 gives the tonnage for the block.

DEVELOPMENT METHODS

Shafts

In March 1942, after the Kearney property had been thoroughly core drilled, the company started sinking two shafts. One was sunk 375 feet and the other 625 feet. The 375-foot shaft now is used only for ventilation and as a second escapeway for men. The deeper shaft is the main operating one.

Generated on 2024-09-19 21:01 GMT / https://hdl.handle.net/2027/osu.32435030643779
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from THE OHIO STATE UNIVERSITY

Both shafts have three compartments, two for hoisting and one for ladders, pipes, etc. Over-all size of each shaft is approximately 8 by 16 feet, the compartments being 4 by 5 feet inside the timbers. Each shaft is completely timbered with 8- by 8-inch Oregon-fir timbers and is lagged with heavy 2-inch planks outside the timbers.

In sinking these shafts, three shifts were worked with seven men on each shift. Each sinking crew was composed of four miners, a topman, a hoistman, and a shift boss. Heavy jackhamers with 1-1/4-inch hollow round steel were used. Detachable bits were not used, steel being sharpened in the mine shop. Sixty percent gelatin dynamite was used for blasting, with electric blasting caps. A center or wedge-cut round was used with 28 to 32 holes to the round. A temporary wooden headframe, small electric hoist, and sinking bucket first were used, but later the present 44-foot wooden headframe was erected and a larger electric hoist was installed.

Levels were opened from both shafts at the 375-foot point and also from the main shaft at the 500- and 625-foot points.

All ore and waste is caged to the surface in 20-cubic-foot mine cars. A double-drum hoist with 150-horsepower electric motor is used for hoisting. Cages are hoisted in balance. There are electric hoisting signals on each level for signaling the hoistman. Landing chairs on each cage are used while loading and unloading cars on cages.

Drifts and Crosscuts

Drifts and crosscuts usually are driven 7 by 8 feet. No timber is required for support. A 21- to 23-hole burn-cut round is used, with 5 holes in the burn-cut. A 6-1/2-foot round is drilled, which usually breaks about 6 feet. Sixty percent gelatin dynamite is used with electric blasting caps. All drilling is done with 3-1/2-inch automatic drifters with 1-1/4-inch hollow round steel.

Formerly all bits were forged onto the drill steel and were sharpened in the shop on the surface. Recently the company changed to tungsten-carbide bits with marked success. The bits are used in stoping as well as in developing and during the past several months have averaged more than 230 feet per bit. The ground drilled comprises hornstone, garnet, and other silicates.

All mucking is done with mine car loaders, which load directly into 20-cubic-foot cars. If the distance isn't over 500 to 600 feet, the cars are hand-trammed to the shaft and caged to the surface. For longer distances, loaded cars are hand-trammed to a siding, then taken to the station in trains by a storage-battery locomotive.

Raises

Formerly, conventional raises were used with standard chute pockets. However, the ore in the stopes usually breaks into large pieces, and much

Generated on 2024-09-19 20:57 GMT / https://hdl.handle.net/2027/osu.32435030643779
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from THE OHIO STATE UNIVERSITY

trouble was had in blasting the pieces in the chutes. Repair costs for chute pockets were high, as large chunks of ore often hung-up in the chute or pocket, and it would be necessary to blast to free them. In order to avoid this expense, the company finally removed all wooden chute pockets from raises and allowed the muck to fall directly to the track level. The broken ore (or waste) was then mucked by a mine-car loader directly into mine cars, similar to mucking in the face of a drift or crosscut.

Raises usually are driven approximately 7-1/2 feet in diameter and at an angle of approximately 65 degrees, so that no timbers are necessary. Heavy, self-rotating stopers are used with 1-inch quarter-octagon hollow steel. Detachable tungsten-carbide bits now are used, although formerly standard bits were forged onto the drill steel. A 4-hole burn-cut round is blasted with 60 percent gelatin dynamite and electric blasting caps. Enough muck is allowed to remain in the raise so that the miner can set-up on top of it for his first few rounds. After that he places stulls for his set-up.

MINING (STOPING) METHODS

Most of the ore at the Kearney occurs in bedded deposits along several large pre-mineral faults, the beds dipping approximately 15 degrees southerly.

Ore shoots first are outlined by diamond drill holes, then raises are driven up through the ore shoot to its top, then stoping begins at the top and proceeds downward. In this way, the back of the stope is thoroughly cleaned, and all loose slabs are removed before the stope is enlarged downward. Open stopes are used, with pillars for roof support. Where the ore shoots are large, ore pillars approximately 20 feet in diameter are left on 50-foot centers. Where the ore shoot is small, no pillars may be required. (Fig. 9.)

As has been mentioned in a previous section, raises are driven upward at an angle, so that only a few stulls are necessary. Self-rotating stopers with 1-inch quarter-octagon steel are used. After the raise has reached the top of the ore shoot, stopers are used to enlarge the raise directly beneath the overlying barren material. When the top of the raise has been enlarged, jackhamers with 1-1/4-inch hollow round steel are used to drill holes downward around the sides of the raise, and 3-1/2-inch automatic drifters with similar steel are used to slab around the raise at the top of the ore. The drifters keep a round ahead of the jackhamers, thus leaving a bench for the jackhamer drilling. Ore is blasted down with 60 percent gelatin dynamite and electric blasting caps.

At first the broken ore falls down the raise to the rail level, where it is loaded into cars with a mine car loader (or shovel loaders, as it sometimes is called). As the stope progresses away from the raise the broken ore is pulled to the raise by using a scraper and double-drum electric or air hoist. Where possible, raises are spaced on 100-foot centers, so that scraper hauls will be relatively short, and much of the blasted ore will fall into the raise without the use of a scraper.

Generated on 2024-09-19 21:07 GMT / https://hdl.handle.net/2027/osu.32435030643779
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from THE OHIO STATE UNIVERSITY

Generated on 2024-09-19 21:07 GMT / https://hdl.handle.net/2027/osu.32435030643779
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Digitized by Google

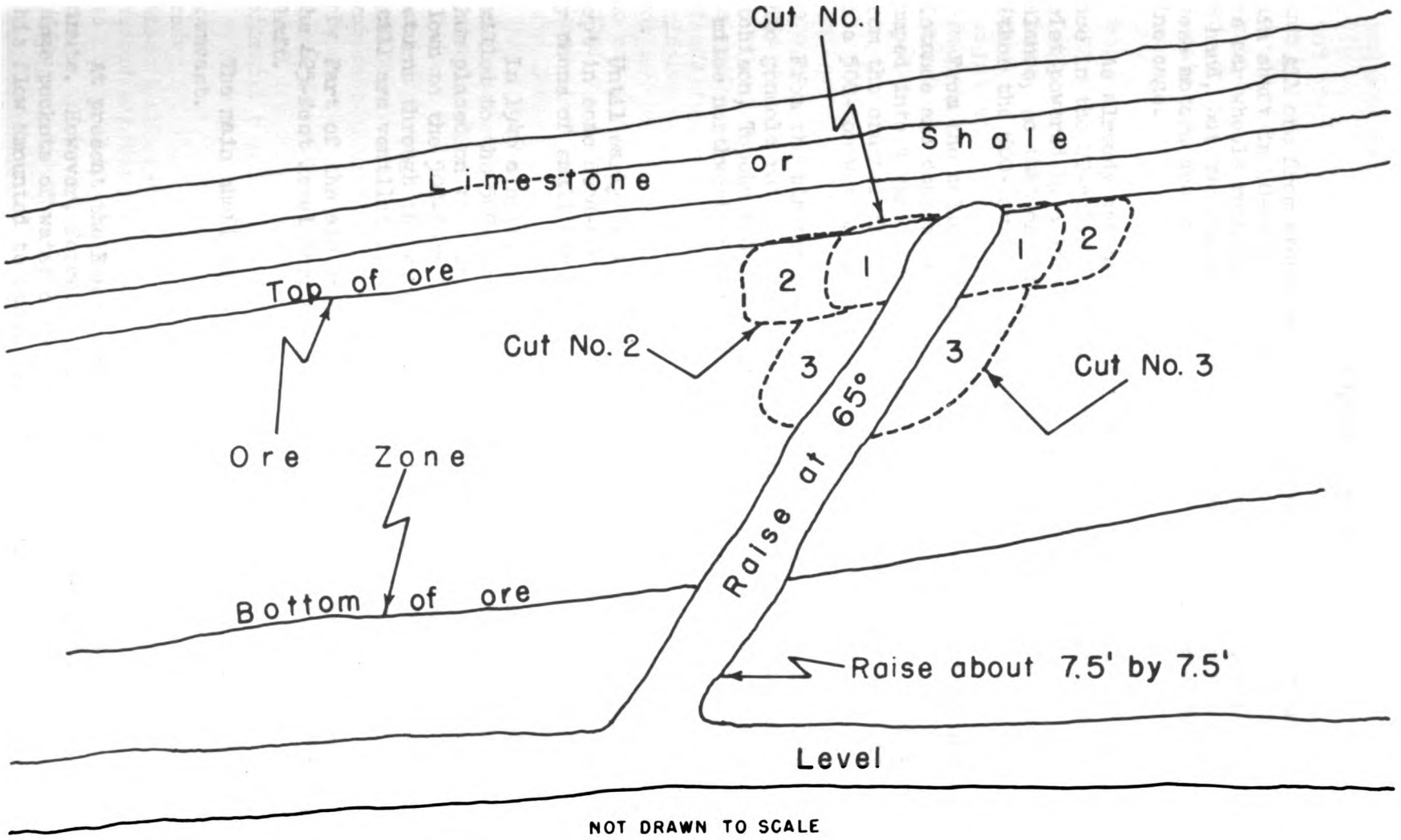

Figure 9. - Starting a stope.

Original from THE OHIO STATE UNIVERSITY

TRANSPORTATION

All ore from stopes and development headings is transported to the main shaft in 20-cubic-foot rectangular mine cars on 18-inch-gage track, the car wheels rotating on ball bearings. Formerly, all tramming was done by hand, but two small storage-battery motors now handle most of the hauling. These motors are of the type that can be transported between levels on the mine cage.

As already has been explained, all ore and waste is caged to the surface in the 20-cubic-foot mine cars. Hoisting is done by a double-drum hoist powered by a 150-horsepower electric motor. Cages are hoisted in balance, so that one cage is at the surface while the other is spotted at either the 500- or 625-foot level in the mine.

From the collar of the shaft the cars of waste are hand-trammed a short distance and dumped on the waste dump. The ore cars are hand-trammed and dumped into a small bin immediately above a 15- by 28-inch jaw crusher. From the crusher the ore falls to a belt conveyer, whence it is elevated to a 500-ton wooden ore bin.

From the bin the ore is hauled in trucks for 1-3/4 miles and loaded into gondola railroad cars at Hanover. From there the ore goes, via Atchison, Topeka & Santa Fe Railroad, to the Peru Mining Co. mill, about 4 miles northwest of Deming.

VENTILATION

Until early in 1946, ventilation at the Kearney mine was natural, except in some dead-end drifts and workings, where fresh air was circulated by means of small air blowers and canvas ventilation tubes.

In 1946 a hole, 8 inches in diameter at its lower end, was churn-drilled to the 500-foot level. A 24-inch electrically powered blower was then placed on the surface at the collar of this hole, and fresh air was blown to the 500-foot level. This air circulates through that level, then returns through the workings and main shaft to the surface. Dead ends still are ventilated, when necessary, by small fans and canvas tubing.

Part of the air which is blown down the churn-drill hole also goes to the 625-foot level through stopes and raises and then back to the main shaft.

The main shaft is upcast, whereas the 375-foot auxiliary shaft is downcast.

DRAINAGE

At present the Kearney mine makes only about 100 gallons of water a minute. However, formerly this quantity was sometimes much greater, as large pockets of water often were found in driving mine workings. In 1946 this flow amounted to about 300 gallons a minute but since then it has decreased.

Generated on 2024-09-19 20:57 GMT / https://hdl.handle.net/2027/osu.32435030643779
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from THE OHIO STATE UNIVERSITY

Underground water is collected in sumps on the 625-foot level, pumped to the 375-foot level, and thence to the surface. Fifty horsepower, 2-stage, centrifugal pumps are employed.

Part of this mine water is stored in a tank at the surface for fire protection, compressor cooling, etc. The rest is delivered to the Kennecott Copper Corp. for use in leaching lowgrade ore dumps.

SAFETY MEASURES

Every precaution is taken by the management to make the Kearney as safe as possible. Each raise has a guard rail around its top, and men who work near dangerous open stopes and raises are required to wear safety belts. All electrical equipment is carefully grounded. First-aid kits and stretchers are kept at convenient places on the property. Bosses and other key men have received training in first aid from the Bureau of Mines or the Red Cross.

Two escapeways are provided, one up the main shaft and the other up through mine workings from the 625- to the 375-foot level, thence on to the surface through the No. 2 shaft.

Approved cages are used for lowering and hoisting men. These have approved safety bonnets, safety catches, and well-constructed gates. Landing chairs are used on each cage for loading and unloading cars. Electrical call signals are installed at each level.

SURFACE PLANT

As all ore from the Kearney mine is shipped to the Peru mill near Deming, only a small surface plant is maintained at the mine. This plant consists of a superintendent's office, an engineering office, lamp house, and small warehouse in one building; a combination hoist and compressor house near the main shaft; a small machine shop; a drill-sharpening shop; a change house for the men; and a crushing plant and ore bin.

The hoist-compressor house contains a 150-horsepower, double-drum, electric hoist, which operates the two cages in the main shaft, an 800-cubic-foot-a-minute air compressor powered by a 150-horsepower synchronous motor, and another 800-cubic-foot-a-minute compressor powered by a 150-horsepower electric motor.

The machine shop contains lathe and other equipment for making repairs to most mine machinery.

The drill-sharpening shop contains furnaces, etc., for sharpening drill steel. However, the company now is using detachable tungsten-carbide bits, so that most of this equipment is not being used at present.

A change house, which contains shower baths, toilet facilities, etc., is provided for the men.

Generated on 2024-09-19 20:56 GMT / https://hdl.handle.net/2027/osu.32435030643779
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from THE OHIO STATE UNIVERSITY

A crusher house contains a jaw crusher that crushes all ore to minus 3 inches. As already explained, the ore is trammed from the main shaft, dumped into a small bin above the crusher, is crushed, then falls to a 24-inch transfer conveyor belt, is elevated, and dumped into a 500-ton ore bin by an 18-inch conveyor belt.

All equipment is operated by electricity, which is furnished the mine by the Community Public Service Co. (this company operates in Lordsburg, Silver City, and the Central Mining District of Grant County, as well as many outlying communities).

ORGANIZATION

The company organization at the mine consists of a general manager, a general mine superintendent, a mine engineer, an electrician, several mechanics, a blacksmith, two shift bosses in the mine (one on day and one on afternoon shift), and miners, muckers, etc.

The manager of the mine also is general manager for the Peru Mining Co. properties in the district, and the general mine superintendent also supervises the Peru mines.

The main district office of the company formerly was in Silver City, but when the Premium Price Plan for Copper, Lead, and Zinc expired on June 30, 1947, the main office was moved to the Pewabic mine near Hanover, with a branch office for superintendent and mine engineer at the Kearney mine.

WAGE SCALE

The New Mexico Consolidated Mining Co. paid the following wages in May 1948:

Occupational classification	Hourly rate
Underground:	
Diamond driller	$1.335
Mechanic, semiskilled	1.235
Trackman	1.235
Cageman and pumpman	1.235
Shovel operator	1.235
Miner	1.235
Scraper hoistman	1.235
Grizzleyman	1.135
Pipeman	1.135
Miner's helper	1.135
Trackman's helper	1.135
Mucker	1.105

Generated on 2024-09-19 20:57 GMT / https://hdl.handle.net/2027/osu.32435030643779
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from THE OHIO STATE UNIVERSITY

Occupational classification	Hourly rate
Surface:	
Carpenter	1.335
Mechanic	1.335
Electrician	1.335
Steel sharpener	1.335
Hoistman, double-drum hoist	1.335
Hoistman, single-drum hoist	1.235
Mechanic, semiskilled	1.235
Electrician, semiskilled	1.235
Carpenter, semiskilled	1.235
Top lander	1.135
Truck driver	1.135
Steel-sharpener's helper	1.105
Mechanic's helper	1.105
Crusherman	1.105
Laborer	1.035
Mill (near Deming):	
Flotation foreman	1.335
Machinist	1.335
Electrician	1.335
Flotation operator	1.255
Mechanic	1.235
Ball-mill operator	1.185
Filter operator	1.135
Chemist's helper	1.135
Crusherman	1.105
Car dumper	1.035
Car loader	1.035
Re-agent man	1.035
Laborer	1.035

COSTS

The following data give distribution of labor and supplies and also distribution of total costs, in percentage.

General labor distribution:

	Percent
Supervision	3.0
Mechanics	4.4
Miscellaneous surface	25.5
Mining	62.2
Development	4.9
	100.0

Generated on 2024-09-19 20:58 GMT / https://hdl.handle.net/2027/osu.32435030643779
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from THE OHIO STATE UNIVERSITY

General supply distribution:

	Development	Mining
Explosives	27.9	11.8
Steel	38.2	13.3
Diamond drilling	24.9	--
Maintenance	--	21.3
Hauling ore	--	23.8
Other	9.0	29.8
	100.0	100.0

General cost distribution:

Diamond drilling	3.5
Drifting	5.3
Raising	1.4
Hoisting and pumping	10.0
Stoping	28.0
Mucking and tramming	23.6
Coarse crushing	6.4
Hauling ore	5.2
Overhead and general expense	16.6
	100.0

Generated on 2024-09-19 21:00 GMT / https://hdl.handle.net/2027/osu.32435030643779
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from THE OHIO STATE UNIVERSITY